

REMARKS

The Office Action notes that claims 22-67 are currently pending in the application.

In the Office Action, the Examiner: (1) objected to claims 38-54 and claims 51-54 under 37 CFR §1.75(c); (2) objected to the amendment filed 9/5/03 under 35 USC §132; (3) rejected claims 42 and 59 under 35 USC §112; (4) rejected claims 22-31, 33-38, 40, 41, 46-50, 55, 57, 58, and 63-67 under 35 USC §102(b); and (5) rejected claims 44, 45, 61, and 62 under 35 USC §103(a). Applicants respond to the Examiner's objections and rejections below.

I. Objections Under 37 CFR §1.75(c)

The Examiner objected to claims 38-54 under 37 CFR §1.75(c) as being of improper dependent form. Applicants have rewritten claim 38 in independent form and respectfully submit that claims 39-54 are in proper dependent form.

The Examiner also objected to claims 51-54 under 37 CFR §1.75(c) as being of improper dependent form. The Examiner alleges that the limitations of claims 51-54 fail to further limit a method of use. Applicants respectfully submit that the limitations of claims 51-54 do further limit a method of use and are in proper dependent form.

Claims 51 and 52 both further limit the step of "providing the settling chamber with a top section and a bottom section, an outlet port positioned on the top section, and an inlet port positioned on the bottom section, wherein a ratio of height to width of the settling chamber is greater than 0.7" as recited in claim 38, as amended. Claim 51 further limits claim 38 by reciting that the settling chamber provided must also have a bottom section that is cylindrical, in addition to the other settling chamber limitations recited in claim 38. Similarly, claim 52 also further limits claims 51 and 38 by reciting that the settling chamber provided must also have a bottom

with a diameter of 48 inches, in addition to the other settling chamber limitations recited in claim 38.

Claims 53 and 54 both further limit the step of “introducing a gas fluidized particle stream through the inlet port at a given volume flow rate” as recited in claim 38, as amended.

Claims 53 and 54 further limit claim 38 by reciting a minimum and maximum volume flow rate, respectively, at which the gas fluidized particle stream is introduced.

II. Objection Under 35 USC §132

The Examiner objected to claims 43 and 60 under 35 USC §132. The Examiner alleges that the amendment filed 9/5/03 introduced new matter into the disclosure. Applicants respectfully submit that the amendment filed 9/5/03, specifically claims 43 and 60, did not introduce new matter into the disclosure.

The Office Action states “the Examiner cannot find any disclosure of the ‘radial introduction of the gas’ as claimed in claims 43 and 60.” Applicants direct the Examiner to Figure 3 which illustrates the radial introduction of the gas. In addition the specification discloses the “inlet port is located in a side of the bottom section” [p 6, line 18-19] and “the inlet port is constructed about a substantially horizontal axis and the axis of the inlet port is substantially perpendicular to the axis of the bottom and top sections [p 7, line 14-16]. This is the definition of a radial inlet. Therefore, the objection to claims 43 and 60 based upon 35 USC §132 should be withdrawn.

III. Rejections Under 35 USC §112

The Examiner rejected claims 42 and 59 under 35 USC §112, second paragraph. The Examiner alleges that it is not clear "how the axes of rotation of the flow patterns are primarily horizontal." The Office Action further states, "if the streams are perpendicular to the inlet

stream, then it would seem to dictate that the axes of rotation of the flow patterns are primarily vertical."

The axes of rotation of the flow pattern are primarily horizontal and perpendicular to the inlet stream. It is three dimensional space--the inlet is the x-axis, the vertical is the z-axis, and the axes of rotation of the flow pattern are parallel to the y-axis. Further, the gas-fluidized fine particle stream is circulated inside the classifier vessel in such a manner as to define flow patterns within the vessel. This provides for physico-chemical conditions whereby particles having a size greater than about 10 microns are separated from smaller particles which enables particle separation in the invention. These physio-chemical conditions are two recirculating sympathetic vortices. One large recirculating vortex is formed where the flow enters the chamber and a second sympathetic vortex is formed above the first. Various geometries will allow this, including a conical top or a taller chamber with a flat top. It is also well known to those skilled in the art that it is difficult to transport mass (including large particles) from one vortex to another, as they are "closed" systems.

It is another aspect of the present invention that the gas velocity at all surfaces is sufficiently low that large particles are not re-entrained in a low-density electro-static mass. The prior art typically uses baffle plates, which have been proven to fail in the application of interest to the present invention (illustrated in Fig. 1 and Fig. 2 of the present application). Therefore, the rejection to Claims 42 and 59 based upon 35 USC 112 should be withdrawn.

IV. Rejections Under 35 USC §102(b)

The Examiner maintains the prior rejection under 35 USC §102(b) of claims 22-31, 33-38, 40, 41, 46-50, 55, 57, 58 and 63-67 as anticipated by Zelazny et al. Applicants respectfully traverse this rejection.

Zelazny et al. discloses a porous membrane which operates as a baffle and has a flow pattern which is vertical (Fig 1). It is well known to those skilled in the art that gas streams with commercially significant loadings of electrostatically or "sticky" nanoparticles can plug or clog even extremely coarse porous membranes. After the membrane clogs, the membrane begins to act as a baffle, or impingment plate. This configuration has been shown to be ineffective in the field of application of the present invention (see Fig. 1, Fig. 2, and Page 2, Lines 8-17).

Further, the applicants respectfully submit that Zelazny et al. does not disclose most features recited in the claims of the present invention. For example, Zelazny et al. is silent with respect to the height and width of the cyclone disclosed so it can not be inevitable from the disclosure that a ratio of height to width of the settling chamber is greater than 0.7. Further, there is no mention in Zelazny et al. of a ratio of height to width of the settling chamber greater than 0.7, a ratio of the size of the base to the size of the inlet port of approximately 4 to 1, introducing gas fluidized particle streams at a given velocity of 10 to 1,000 scfm, and introducing a gas fluidized particle stream comprising particles having a minimum particle size of approximately .001 micron. Zelazny et al. simply does not disclose "establishing a mainly circulating flow pattern in the bottom section" and "establishing a secondary recirculating flow pattern in the top section" as in the claims. Zelazny et al. is a simple cyclone separator and Applicants are aware of no teaching that would indicate that simple cyclone separators inherently form multiple flow patterns. In fact, Fig. 1 of Zelazny et al. would seem to indicate the opposite. Therefore, the rejection under 35 USC Section 102(b) of Claims 22-31, 33-38, 40, 41, 46-50, 55, 57, 58 and 63-67 as anticipated by Zelazny et al. should be withdrawn.

V. Rejections Under 35 USC §103(a)

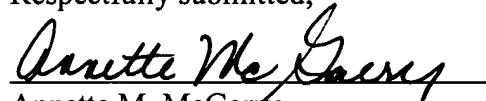
The Examiner rejected claims 44, 45, 61 and 62 under 35 USC §103(a) as being unpatentable over Zelazny et al. Applicants respectfully traverse this rejection.

Figure 2 of the Zelazny et al reference discloses a simple cyclone separator with the lower discharge removed is disclosed. The upper portion of this apparatus operates as a cyclone and is different from the present invention, as discussed above. Further, the method disclosed by Zelazny et al involves operation at 4500 ft/min resulting in a separation cut-off of 500 microns. The present invention contemplates such low levels of separation performance as being far below the acceptable performance of standard equipment (see Fig. 1, Fig. 2, and Page 5, Lines 15-17). Zelazny et al. does not disclose or teach the formation of an interface or the formation of a flow pattern as is taught in the present invention, because neither an interface nor a flow patterns occur in the Zelazny et al. devices. Therefore, the rejection under 35 USC Section 103 of Claims 44, 45, 61 and 62 as anticipated by Zelazny et al. should be withdrawn.

VI. Conclusion

In view of the aforesaid, Applicants respectfully submit that all claims pending herein are in the condition for allowance. Favorable reconsideration is hereby requested. Further, the Examiner is requested to please contact the undersigned so that a telephone interview may be scheduled.

Respectfully submitted,



Annette M. McGarry
Attorney for Applicants
Reg. No. 34,671

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WILDMAN, HARROLD, ALLEN & DIXON LLP
225 West Wacker Drive
Chicago, Illinois 60606-1229
Telephone: (312) 201-2353
Facsimile: (312) 201-2555